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THE Rational Farmer,

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A TREATISE

ON

Agriculture and Tillage,

Wherein many errors of common Management are pointed out, and a new more improved, and profitable ſyſtem ſuggeſted and deſcribed; interſperſed with many occaſional and intereſting obſervations:

By MATTHEW PETERS,
Member of the *DUBLIN SOCIETY*, for the Encouragement of HUSBANDRY, and other uſeful Arts.

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IS,
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THE AUTHOR.

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In ſome of the copies, the reader is deſired to correct the following ERRORS.

Page 6, line 5, for *Columello*, read *Columella*, page 17, laſt line, for draft, read draught. page 30, line 4, for ni, read in. page 52, line 4, after break; read up. page 60, line 3, for ſopey, read ſappy. page 73, line 1, dele. even, page 77, laſt line but one, for fuffer, read ſuffer. page 78, line 6, for fineſt, read fineſs. page 89, line 19, end of ſame line, for are, read is. page 94, line 25, for corps, read crops. page 95, laſt word of that page, for tais, read this. page 100, for mor, read more.

In [illegible] is desired
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Page 6, line [illegible] read [illegible]
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TO THE

READER.

9·10·02.

THE following treatiſe on agriculture, is adapted to inform the impartial, the prejudiced cannot be benefited by inſtruction; they can ſcarcely be deemed rational beings, and are therefore unfit for ſocial conferences. However, tho' there are ſuch animals interſperſed, yet, this is no reaſon why the more prudent and candid, ſhould be deprived of any ſalutary inſtructions for the improvement of their minds, or increaſe of their fortunes.

Agriculture may be juſtly called a *Science*, and indeed it is a noble ſtudy. The firſt wiſh of *Virgil* was to be a good philoſopher; the ſecond, a good huſbandman; and God dealt with him, as he did with *Solomon*; he made him one of the beſt philoſophers, and the beſt huſbandmen, and to adorn and to diſplay the honours of thoſe characters, the beſt of poets. He made him, beſides all this, a rich man. *Columello* ſays "huſbandry is next "in kindred to philoſophy, as it comprehends "more parts of philoſophy than any one "profeſſion, art, or ſcience in the world". *Cicero*, "declares the pleaſures of huſbandry, "to approach the ſacred entertainments of "the philoſopher"; and our once celebrated, but now too much neglected *Cowley* obſerves, "The three firſt men in the world, are a "gardener, a huſbandman, and a grazier".

But alas! how few of our preſent cultivators of land, can lay claim to theſe honours! unimproved by ſcience, untaught to make judicious and rational obſervations, to try experiments and draw concluſions, in order to attain the truth; they know no more than what they have learnt from their fathers, and fooliſhly conceive that all knowledge is centered within their poor and ſhallow ideas.

It is owing to ſuch men that agriculture is reſtrained in its progreſs, and ungratefully deny'd in the bounties it would beſtow. They know nothing of the qualities and operations of bodies upon each other. That if they eat, indeed, it will aſſuage their hunger, and if they drink plentifully of ſtrong liquor, it will make them drunk; they can very well witneſs: but talk to them about powers, whereby their draft is to be eaſed, or of alkaline ſalts, with which all vegetable and animal ſubſtances are replete, as being material agents in the work of vegetation, &c. they will think you not ſane; or, at beſt, pronounce you a little maddiſh.

Thus did *Sir Walter Blyth* lament, *IMPROVER IMPROVED*, page 4. "There is, ſays he, among you , acalumniating and depraving every new invention: "and the moſt guilty of this are your old, "mouldry leaven, who themſelves and their "forefathers, have been accuſtomed to ſuch "a courſe of huſbandry as they will follow, "and no other. What forſooth, ſays this "ſelf-ſufficient man, who taught you more "wit, than your forefathers? Would they "have neglected this advantage had there "been any? This proud and unteachable "ſpirit an ingenious man abhors; which "banes and poiſons the very plenty of the "nation".

The Author of DISCOVERY of HIDDEN TREASURE, ſays, page 86. "I "wiſh that they who love not to try experi-"ments, may take their eaſe, and will lay "no heavier taſk upon them, than to wiſh "well to others; only I beg them to conſid-"er what a wretched caſe they themſelves had "been in, if ſome more inventive brains had "not found out the plough, and the uſe there-"of; as alſo, if ſome of a like diſpoſition,

" had not diſcovered new ways for the fructifying of land, when its worn condition " refuſed encreaſe ſufficient to maintain the " numerous people".

But why ſhould it be wondered at, that new inſtructions are turned into ridicule, when ſo many recently known artificial graſſes are ſo much rejected? The ignorant ſay, they will not do in this part of the country, the ſame ſort of people, ſay the ſame elſe where; ſo that in fact, I may comparatively ſay with *Solomon*, one farmer among a thouſand I have found, but not one huſbandman among all theſe, have I found! " Our fore-fathers", ſay they, " never uſed " them"; Idleneſs never wants an excuſe: why might not our anceſtors upon the ſame ground, have held their hands in their pockets, and preſumed that turnips, or clover would not grow amongſt us. It is well known what oppoſition was made to turnips but a few years ſince by the farmers: what would they now part with them for? Let them from this circumſtance conſider and be wiſe.

Emulation is the only ſpur to improvement and knowledge in every art and ſcience; the author therefore earneſtly recommends it to the induſtrious huſbandman, there is not a more ſtimulating ingredient to attain wealth and honour: it is ſuch a juſtifiable ambition, that without it, man be-

becomes a low and deſpicable creature, it is a ſocial virtue, the characteriſtic of wiſdom, and the only ſtep to render him uſeful in ſociety.

At this time in particular, there are ſome circumſtances to engage the attention of the farmer, to every hint of improvement: the progreſs making in our rival kingdom France, in agriculture; as well as trade; is truly alarming: this ſhould be looked on with a jealous eye, as the bulk of the people in England, are the immediate manufacturers of our commodities.

If real and ſolid improvement in agriculture, and all ſorts of huſbandry are wanting, and land yet continues to riſe, it is manifeſt that proviſions muſt riſe in proportion: and it is as manifeſt, that ſuch advance muſt ultimately fall on the price of our goods: our trade muſt then ſuffer, and an opportunity will be given to our natural enemies, not only to under-ſell us for a time in foreign markets, but to eſtabliſh themſelves firm and permanent in their advantages. It is too notorious that they have lately ſhewn a greater concern for the improvements of land, than our countrymen; a circumſtance more to be dreaded than their mighty armies, or their encreaſing fleets.

The author would not unneceſſarily ſwell theſe introductory remarks; he juſt mentions therefore, that in the following ſheets, the uſe of the ſpike-roller, ſcarificator, and Ducket's two coulter and ſhare plough, for breaking up ley land is introduced: manures are properly and diſtinctly conſidered; the doctrine of vegetable manures diſcuſſed and recommended; and obſervations are made on the quantity of wheat generally ſown on an acre; together with a table of calculations, wherein the number of grains of wheat, which one acre will take, diſtributed from one inch to twelve inches ſquare, is ſet forth.

The clay-kiln is deſcribed, with its great uſe in providing a cheap quantity of clay-aſhes, which are very fructifying in cold ſtrong land.

A new ſyſtem of rearing pigs is ſuggeſted, with the proof of profit, and uſe to the ground from their feeding upon it: the feeding black cattle with turnips, the turnip-rooted cabbage, &c. &c. is taught, and ſome remarks on artificial graſſes, with many other inſtructing occaſional obſervations on various ſubjects are freely ſubmitted: as the author is deſirous of making this ſmall performance as uſeful as he can, within the compaſs of a little more additional expence to himſelf, than his propoſals ſet forth, he hath added a conſtruction of the *Norfolk plough*, with his obſervations upon it.

On the whole, Uſe is the intention of the writer: if this end be ſecured, he flatters himſelf, the inelegancies of his manner will be ex-

excuſed; and he will be happy in the idea, that he has paid the beſt acknowledgement to his ſubſcribers.

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THE Rational Farmer.

THE firſt obſervation of the farmer, will be on the nature of the various ſoils he is about to improve, and as various as he may find them, he will in due courſe, find them all reſpectively uſeful under proper management.

Land, is like the heart of man, ſome naturally better, ſome worſe; all imperfect and requiring much ſtudy and cultivation.

I ſhall therefore proceed on the ſeveral textures of land in general, as each field cannot be diſtinctly conſidered.

The firſt to be noted is a ſtrong clay ſoil, as being moſt fertile when properly brought into action, attended to with oppoſing manures, and the water judiciouſly drained off.

To fit ſuch land for corn, the farmer ſhould be poſſeſſed of a good yoke of oxen, and a ſtrong plough; then as ſoon as the weather in the ſpring will admit, before it is too dry and hard, he muſt break it up, not more than four inches deep; and very regularly turned, having firſt ſcarified it with the ſcarificator croſs ways: this breaking up will be eaſily done, be the ſoil ever ſo ſtubborn, with four oxen of about ſeven, or eight hundred weight each, a ſharp coulter, and a ſhort plough; for in ſuch land a ſharp coulter is a very material eaſe to the draft.

In about a month after, croſs plow it (with a ſharp coulter as before,) not entering more than one inch deeper than the firſt plowing.

At the beginning of may, the ſtrong earth will be ſo much meliorated, that a heavy drag, or harrow, with well ſharpen'd teeth, will cut and break it to pieces: if the land ſhould be ruſhy, or any ſtubborn lumps of graſs, or ſedge, remain on the ſurface of the ground, you may gather ſuch together and burn them in different heaps on the land, and ſpread the aſhes immediately: then plow the ground a third time, which will bring the ſeaſon to the middle of may, plowing it an inch deeper than the laſt time, and turn the ground very evenly, and let it lye a fortnight unharrowed.

The beginning of june, ſow it with turnip ſeed on the rough ſurface, pretty thick, and only buſh cover the ſeed; (ſowing this land with turnip ſeed, at this time, is only a ſubſtitute for ſea-ſand, or other opening manures, if ſuch cannot be obtained:) as the more hollow and expoſed the parts are, the greater effect the weather will have on it,

In auguſt, roll the turnips ſmooth, when they are very dry, with a ſpike-roller as hereafter deſcribed, then plow them in, letting the ground lye in the rough, until the beginning of october; at which time, harrow it well, and plow it up for the fifth and laſt time in narrow ridges to receive the wheat; which ſhould not be deferred longer in ſuch land, for fear of a wet ſeaſon enſuing; if this work can be done in auguſt, or ſeptember, 'twill yet be better, for this reaſon: and it will ripen more ſeaſonably, as all corn ripens later in a ſtrong, than a light ſoil.

Plowing-in turnips with their full vigour of leaves, opens and divides the compacted texture of the land, and enriches it to a degree, not ſo eaſily to be conceived as experience has demonſtrated: and I may ſafely pronounce, that this firſt and ſhort tilth for wheat, if ſowed, as 64 pounds weight to a ſtatutable acre will produce 2100 pounds weight in return; which is, at 64 pounds to one buſhel, near 33 buſhels wincheſter. If I could prevail on the farmer, to leſſen the above weight of 64 pounds, to 48, I am ſure, he would find his account in it, if his land is in good order.

Here I would enforce it on the farmer, to cut his wheat before it is dead ripe, or, at leaſt, earlier than the general manner: the advantages of which are obvious, as wheat thus long ſtanding will looſe much even by a gentle blaſt of wind, and the neceſſary works of reaping, binding, &c. and this of its beſt grains. - whereas, if cut a little green, or before it arrived at the common ripen'd ſtate, there would be no loſs, or, if any, only of the worſt, or ſmall grain.

I alſo recommend to him, to pen his ſheep on the laſt plowing, before he ſows his wheat, and then ſow and harrow the ſheep dung and wheat in, or very lightly plow in the wheat if the land be light, and then roll the ground with a heavy roller; or pen on the wheat as ſoon as it is harrowed in. My opinion is in favour of the former practice, becauſe all the dung is then covered, whereas, by the latter, the dung is left uncovered to be robbed of its nutritious juices by the air and ſun.

As ſoon as the crop of wheat is removed from the land, ſpike roll it, and plow in the ſtubble with the ſtrong plough, one inch deeper than the former plowing, which will bring the tilth to ſeven inches: under this fallow let it lie thro' the winter in very narrow ridges, while the farmer is conſidering what he ſhall next do with it.

I ſhall certainly recommend wheat again, to give an opportunity of finally reducing it to an effectual ſtate for future tillage, and orderly crops. For, as the firſt well given blow is half the battle, ſo the firſt proceedings in reducing ground for tillage judiciouſly, or otherwiſe, are the making, or marring it: one good crop of wheat has been already obtained; it will not be prudent to load this heavy land with ſpring corn, as the parts are not yet ſufficiently relaxed and divided, after the winter's wet.

To bring the whole maſs into a fruitful body, it will be proper to harrow the rugged fallow in march, or april; as ſoon as the moiſture is well dried up, then ſpike roll it when the ſurface is dry, and plow it up, and in june ſow it with turnips, on a ſpike rolling which you may then give it; or in april, ſow it with buck wheat two buſhels to an acre: in either caſe, ſow it on the rough ſurface, ſlightly covering the buck wheat with a light harrow, or the turnip ſeed with a buſh. In july, or auguſt, plow either of them in, and let the ground lye in the rough till ſeptember, at which time harrow and ſpike roll it. The ſpike-roller is formed by faſtening many ſpikes to the roller, ſtanding out ſeven, or eight inches all round, ſo as to croſs each other in entering the ground; as the teeth in the harrow are fixed in oblique directions to take the intervals between each tooth, with the ſharp part on the ſide of the ſpikes, which firſt enter the ground; they muſt be of the form of the harrow teeth oppoſitely ſet, the hollow, or concave part of the tooth being the ſharpeſt ſide. – A draft of this uſeful implement is given, in the latter part of the treatiſe; the uſe of which may be eaſily conceived, as it is fitted to looſen the ground in ſo deep a manner, and break up the fallow almoſt equally to a plowing, that it may ſometimes be a ſubſtitute for it, when the farmer is much hurried.

If the farmer has uſed only vegetable manure, it will be neceſſary now to call in the aid of ſome one of the five following articles, viz.

Sea ſand, roche lime, ſea coal aſhes, or fine cinders, burnt clay, or the rubbiſh about a brick-kiln. Either will open and keep the parts ſo diſunited, as to carry off the wet, which otherwiſe would lodge in this ſtiff earth.

In october, ſow the wheat as directed, with no more than 64 pounds to an acre, being nearly ſeven ounces to one ſquare perch: I am ſatisfied the farmer will have more, and better wheat than if he ſowed 128 pounds; it is a great ſaving of ſeed, and the land being ſo highly tilled and free from thoſe pernicious weeds and vermin which are brought into the ground with dung, he may be aſſured, that there will be but proper room for the wheat to ſtock; as the diſtance of each grain will be but about 3 inches, (ſee the table:) which I flatter myſelf will be allowed but a reaſonable diſtance in this land: every mans reaſon muſt tell him, that the cloſer the plants are to each other, the leſs can ſuch plants ſtock, and of courſe, fewer and weaker muſt be the ſhoots from ſo oppreſſed a parent.

Hence a general weakneſs takes place thro' the field, which is unable to ſupport its exceſſive demands; then mildews, ſmut, and bad air lay hold of the weak vegetable, and it languiſhes like diſorder'd man.

As to one of the above manures, roche-lime, it ſhould be noted, that the cuſtom is to lay out the lime after it is ſlaked, or let it ſlake on the land before it is plowed in, but I beg the farmer more wiſely to plow in the lime, and let it ſlake in the earth; if lime be ſlaked in the air, a large quantity of the beſt and moſt active particles are evaporated and loſt; whereas, if it be ſlaked in the ſand for the maſon, or in the earth for the farmer, where all its powers are required, the whole ſtrength is preſerved within the bowels of what we want to nouriſh.

After this ſecond crop of wheat is ſaved, I ſhall leave the enſuing courſe to the farmer's own judgment, having delivered the land into his hands in a ſtate fitted for his future comfort: I ſhall next conſider the proper management of a kindlier ſoil, and which requires more tender treatment.

It will be recollected, that I adviſed to break up the ſtrong clay land between wet and dry, and then to let it remain in that ſtate for ſome ſhort time to meliorate. The preſent ſoil to be conſidered, does not need that critical obſervation, or any time to lie at reſt, but on the plowing it up (ſuppoſe in april;) it ſhould be ſowed directly with buck wheat in the following manner.

Firſt, with a common plough make a deep furrow up one ſide and down the other, the breadth of every ridge you ſo intend to break up; and then with the double ſhare and coulter plough, finiſh the ridge. The conſtruction and uſe of this machine, is worth attention. The ſhare and coulter is fix'd a little before and higher than the other, the foremoſt and uppermoſt is light made, the coulter cuts the breadth of the ſod; the ſhare is made to ſkim the ſod off, with a light wing-board, to turn it into the deep furrow of the common plough; the other ſhare and coulter being cloſe ſet behind the firſt, and a little lower, turns the earth juſt uncovered upon the ſod which left it, and ſo forms a new deep furrow for the reception of the next ſod, &c.

This is the uſe of the double ſhare and coulter plough, in land which is not too ſtiff, rugged, and ſtoney. The ſod being thus covered, it will rot while a manure is growing over it, therefore, as ſoon as the land is plowed, ſow it with buck wheat, two buſhels to an acre, and roll the ground with a common roller, to prevent the ſun and air from drying the land too mnch.

In june, or july, as ſoon as the buck wheat is in full bloſſom, roll it flat and plow them in: this will be the ſecond plowing, which ſhould be a little deeper than the firſt; harrow the ground and ſow it with turnips pretty thick. Here obſerve, that while one manuring of buck wheat of 5 or 6 ſhillings charge is rotting, a ſecond manure of turnips of one ſhilling expence only is growing on the new turned up ſtratum.

As ſoon as theſe turnips (which are not to be howed) are in vigour, roll them flat and plow them in decently, and well cover them: let the ground lie under this third plowing till october, or november, after the heavier land is ſown, when you will plow it for wheat; at this time harrow it ſmooth, and ſpike roll it, then plow the ground and ſow it with 64 pounds to an acre. The quantity of wheat to be ſowed, ought however to be determined by the quality of the ground: if very dry, I would ſow the quantity mentioned; if leſs dry, 54 pounds; and if next in quality to a heavy ſoil, 48 pounds: obſerving this as a conſtant rule, to creep by degrees into the earth, and ſteal a depth every manuring; and as the land encreaſes in richneſs, to leſſen the quantity of ſeed. - Thus by proper attention in the courſe of tillage, in a dry ſoil, great advantage may be obtained, by creating a ſtaple where there was none, or, at moſt, but very little.

I cannot tell the farmer that the ſoil which is dry and ſhallow, will produce a crop like the ſtrong, but I may aſſure him a dry ſhallow ſoil may be made with a trifling expence, to yield nearly double the produce of what he generally receives from it.

The method above deſcribed of breaking up, or bringing in land for tillage, ſerves for every varying degree of land, between the rough, ruſhy, ſtrong, and the ſtoney, or flint ground.

Where the ſod of either cannot be ſo eaſily ſkimmed off; the flinty ſurface muſt be turned up with the common plough, and huſbandlike gone over in april, then it ſhould be ſowed with buck wheat; and afterwards as in the former proceſs with turnips, with this only difference, that you muſt give ſuch broke-up land a plowing, or two extraordinary at the ſowing time.

Paſture land being thus prepared for a courſe of tillage, the ſucceſſive rotation of cultivating it, ſhall be noticed in its place. I now proceed to the ſubject of manures.

And firſt, you will obſerve in the paſt proceedings no mention has been made of dung to enrich the land; and if I am not forgiven that omiſſion, how can I expect pardon, when I tell the farmer it muſt not be mentioned when tillage is ſpoken of; unleſs we go into a ſyſtem deſtructive inſtead of improving.

Dung on corn land is fit for nothing but to fill it with weeds and ſlugs, the greateſt enemies to agriculture. Will you then purſue with your eyes open a ſyſtem of tillage which is daily injuring you? let dung be diſmiſſed to the proper province where alone it can be uſeful.

Preſerve it for the *paſture* and *meadow* ground, and keep the dunghill, or mixen decent and compact; let every thing which may be found about the farmer's houſe that will decay, be carried to it, and ſacredly kept for this ſervice: encourage the growth of graſs with its proper manure, and let tillage enjoy only what is beſt adapted for itſelf.

Dunging your paſture land, will enable you to provide a greater ſubſtance for rearing cattle than otherwiſe you could do; it will ſpeedily advance the value of the land, by making it rich and flouriſhing, inſtead of poor and meagre. Encreaſe your purſe, with your paſture profit, let every part of your farm give its willing aid, each part will ambitiouſly do it, if judiciouſly treated, and will vie with each other to ſmile before its maſter.

Vegetable manures are adapted for corn only, they are the beſt and cheapeſt of all manures, there is a richneſs in them, that neither ſea ſand, lime, burnt clay, &c. &c.

can boaſt; theſe only open and ſeparate clogged earth, and more aptly prepare it for vegetation: but vegetable manures by their fermentation in the earth, impregnate it with a ſubſtantial eſſence. Therefore the ſea ſand, &c. may be called preparatives for vegetation, and the natural manures vegetation itſelf.

Vegetable manures will alſo aboliſh by degrees, darnel, poppies, and all ſtinking filthy weeds; they will, as it were, purge away all ſtoppages and interruptions of the well being of the corn, as proper diet and regular nouriſhment will correct and remove bad humours in the conſtitution of man, brought on by unwholeſome food and irregular living, and reſtore the ſhattered enervated body to health and vigour.

A dunghill is through neceſſity, a collection of all manner of traſh, ſubject to every ſeed of the many weeds that are threſhed out and winnowed from amongſt the corn: and what can be expected from it laid out on the ground, but what is received, a crop of weeds.

The farmer to remedy this evil, makes uſe of a ſubterfuge too mean for a man in his ſenſes: he ſows an over-crop of corn, greatly to his loſs and injury, to keep under the filthy weeds which he has juſt put out on the land.

Beſides, that vegetable manures, clover, vetches, turnips, &c. the pure offſpring of nature, have no ſeeds of filth to accompany them, in performing their function of nouriſhing the earth; they are alſo the cheapeſt.

Let the farmer tell me, the expence of laying out dung on an acre, when it is carried to a conſiderable diſtance; and the loſs of the *paſture* land to which it ſhould be deſtined is conſidered: the farmer heſitates, - and therefore I will ſubmit to him the charges of my two vegetable manures in a ſummer.

For two buſhels of buck wheat, 5, or 6 *s.*
For 3 quarts of turnip ſeed, - - - 1 *s.* 6 *d.*
For a man to ſow theſe ſeeds, - - - - 1 *s.*
For carrying them to the field nothing.
In the whole for manuring an acre twice, about - - - - - - - - - - - - - - - - - - - 8 *s.*

Now will the farmer write down at the end of the following articles for the dung manuring.

To carry out the dung, the cart and horſes. - - - - - - - -
A man's wages and diet. - - -
A man's labour to ſpread the dung.

Total.

Will not the difference be very ſtriking?

If the land be of a cloſe texture, I recommend turnips, or vetches, for the firſt manure, in preference to buck wheat, or ſaint foin, as they are more firm and leſs reduceable; and therefore more fit to keep open the pores of heavy land. Buck wheat and ſaint foin, are ſuited to a lighter land as they poſſeſs a more glutinous ſubſtance. The oppoſing of bodies is the grand ſecret in agriculture, with which every farmer ſhould have an acquaintance.

As an eaſy illuſtration of this axiom, let us conſider how hard, inactive, and uſeleſs is a piece of lime ſtone, or flint: in this ſtate of inactivity are all earths deeper than the ſun's influence can affect; but as theſe when raiſed from cold and darkneſs, to warmth and light, are rich and uſeful; ſo the flint, or lime ſtone expoſed to the piercing fire, immediately becomes an animating ſubſtance. The flint, or lime ſtone, being a cloſe and hard body, requires a more intenſe and powerful a diſſolver, than common earth; for as bodies are in quality, ſo in proportion muſt be the oppoſers.

Thus lime ſtone has the intenſe oppoſer fire applied to it, and no ſooner has gone thro' the operation, than it becomes an agent in vegetation, and animates the clogged earth, when juſt before it was a thouſand times harder than what it now enlivens. Sea ſand, &c. &c. are on this principle oppoſed to wet heavy land.

In ſhort -- our whole ſyſtem conſiſts of oppoſing qualities; nor is any thing made in vain. It is to be obſerved, that manures ſhould ever be changed in oppoſite alternatives, like the ſucceſſions of corn, be they of the natural or artificial kinds; never manuring with the ſame kind twice, if it can be avoided, remembering this phraſe --- *A rotation of oppoſites.*

I am now to treat on the various ſorts of manures, which I call artificial, or preparative, ſuch as burnt clay, ſea ſand, lime ſtone, marle, ſcouring of ditches, ſea weed, or ooze, dung of fowls and birds, ſheep dung, woolen rags, ſalt, lime, ſoot, hog's dung, and their hair, neats hair, horn ſhavings, malt duſt and ſoper's waſte, or lees. With ſome obſervations on froſt and ſnow, ſo far as they relate to the farmer's uſeful intelligence.

Clay is by ſome writers diſtinguiſhed into twenty two different ſorts, out of which I ſhall only mention three as needful to our diſcourſe. *viz.* Fuller's earth, the blue and colour'd and ſtrong, heavy, ſtubborn clay.

The firſt, or fuller's earth is in great plenty in *Staffordſhire*, where its uſefulneſs is firſt conſidered in ſcouring and cleanſing woolen cloth, from the oil and greaſe made made uſe of in that manufactory. But it is alſo a high manure for all land, not inclinable to clay: when it is expoſed to the air and rain, it inſtantly diſſolves into a fructifying ſtate; and by its ſolid nature, conjoins the parts of a light ſoil and forms them into a compacter body.

The 2d. or blue colour'd clay, is what they call in the *Iſle of Wight*, malm, or clay marl. The air affects this clay, in much the ſame manner as the former - and its action is much the ſame; it is well known to ſome parts of that *Iſland*, to have been of infinite uſe to the land for wheat; there are various tints, or colours, veined thro' it in the *pit*; it is entirely free from ſtones, or grit, and abounds with ſaline particles.

The 3 d. or common ſtrong clay, or heavy earth, is well known, in many low places, and as often found in ſome countries even on the hills. This is nearly the ſort of land I begun this treatiſe to reclaim, in itſelf it has a durable quality, it is replete with natural ſalts, which are locked up in it, and muſt continue till opened by the labouring hand; there are degrees of quality in this ſort of land, notwithſtanding which, all that come under the denomination of ſtrong clay land, will make for itſelf the manure I am about to ſpeak of: *viz.* Clay burned in a kiln.

The proceſs is thus, in one or two parts of the worſt and ruſhieſt ſituation, mark out a round incloſure, of 17 feet diameter, and dig out two trenches, croſſing each other at right angles, the extent of this circular mark: and in the center, where theſe trenches croſs, make the opening two feet or more wide, this middle opening may be filled up with looſe ſtones to the ſurface of the ground, and the croſs trenches, (or more properly the air funnels) muſt be covered with ſtones that may reach acroſs, not ſo cloſe to each other, as to prevent a quantity of air paſſing up between them.

When this is done, make a ſod, or clay wall, 18 inches thick, for the incloſure about 4 feet high, the other dimenſions will appear in the draught at the end of this treatiſe. In the center, put two, or three furze faggots, and 6 good wood faggots, and a few blocks, covering them ſlightly with more furze, on which lay a covering of clay dug one ſpit deep, any where moſt contiguous on the outſide of the kiln, where all the ſupply for burning is to be regularly dug: on this clay covering, lay another courſe of furze faggots and another covering of clay, and then ſet fire to the furze at the places where the funnels run under, as the air will draw up through, and ſet it properly burning; afterwards the whole attention is to prevent the fire blazing through, and at the ſame time not to ſmother it too much.

Proceed thus till the kiln, or inſide is full, putting in more and a deeper digging of clay, as the fire may advance, or burn thro'; and laſt of all, throw the wall in to burn with the reſt, as its uſe was only to prevent the wind from having effect on the fire: - if there is a depth of clay, you may dig as deep as you pleaſe, provided the clay is not full of water when you put it on the fire. You may form different kilns about the field at pleaſure, if deſigned for manuring the ſame field; & ni that caſe you may burn it more than if it is deſigned to be laid on a light ſoil.

Thus burned, this clay is excellent manure, even for its own ſoil, and for all cold ground, on which you may lay a large quantity, it comes cheap, and may be had at times when other manures may not be obtained; it is profitable alſo for dry ſhallow land, when not too much burned, but rather charred.

Sea ſand is a good manure for all tilled land of the cold and heavy kind, it opens the pores, warms the cold chilled earth, and adds by its abundant ſalts, great vigour to the clay ſoil when expoſed to the air: where plenty of it can be eaſily got, the farmer may reckon on every advantage from its uſe.

Limeſtone-gravel is alſo an admirable manure for all moiſt land, it is the common gravel of *Ireland*, and the common manure of that country. It is ſo called from its being lime ſtone, every one, even the minuteſt, readily burning into lime.

Marl is another manure much uſed in ſome parts of *England*, tho' unknown in others, and the want of which, is by many much lamented! I would not depreciate what I know is uſeful, but to correct ſuch er-

errors let me obſerve, that providence has almoſt every where appointed ſome manure adapted to the ſoil. Man ſince the *Paradiſaical State* of ſpontaneous plenty, is not to ſtand ſtill and expect *Manna* to be dropping into his mouth. He is deſtined to labour, and in that labour to find his relief: by ſearching into the nature of things, he employs and improves his diſtinguiſhing capacity of reaſon; and thus becomes alſo a generous provider for the wants of the irrational ſpecies, who in return are ready to repay his benefits.

Marl is found in the hills, and is of a chalky ſpecies, but more gray and of a ſopey-diſſolving nature; it is good for corn, or paſture ground, where it doth not partake too much of its own kind; tho' ſome lay it indiſcriminately, and as they find with profit, on all ſorts of land.

Some hilly, white, chalky marls are much better than others, which may be diſcovered by bruiſing a ſmall bit, and putting it into a little ſtrong vinegar: if a bit is put in whole, no more of it will ferment, or agitate, than the fine flowry part on the ſides of ſuch piece. Hence I am convinced, that the ſmaller and more broken this marl, the ſooner it will benefit the land on which it is laid: and to confirm this truth, we may obſerve, where the induſtrious farmer lives contiguous to a marl pit, on whoſe ſide a road is frequently uſed, and takes the precaution of turning the rainy torrent, which brings down with it the duſty, or ſmall particles on his land, finds it much more enriched, than by the marl laid on it in the common way.

Scouring of ditches is a good thing to mix with the dung-hill, it is generally very rich, becauſe all nouriſhment from the ſurface of the ground runs into it, and the many leaves which fall into the ditches, add much to its value; but the number of weeds in the hedges, with the dropping ſeeds, renders it unfit for tillage land; therefore I hope the farmer will apply it to a more proper uſe.

Sea weed, or ooze, is found in plenty waſhed up on ſome of the ſea coaſts, particularly where the ſea is foul and rocky; this is a very fertilizing manure, but more particularly ſo, when gathered together, the wet drained out of it and half burned; if too much burned, the aſhes will run together like a cinder called kelp, which when ground to powder is uſed by ſope boilers and bleachers of linen: it abounds with ſalts of a very ſtrong penetrating nature, which makes it ſo much in uſe to purge and bring down the rough, ſtubborn, quality of courſe linen and yarn.

Dung of fowl of all kind is a moſt powerful operator, particularly pigeons dung, and therefore muſt be uſed with caution and on cold land only, for which no manure is equal; it is generally ſcattered on the ground with the hand at the laſt plowing for wheat. A man who is in poſſeſſion of a good rookery may turn it to account, by laying on a covering of earth 4 or 5 inches thick, all over the ſurface of the rookery grove to receive the dung; once a year clear it off, and lay on another coat of earth, and by yearly continuing this method, a large quantity may be preſerved, and when laid out on the fallow, it ſhould be well broke and pulverized.

Sheep dung, or penning ſheep on fallow is very fertilizing; many people pay by the ſcore for ſheep to be penned on their fallow, its advantage being ſo well known, I ſhall only remark, that ſome farmers will not let a night's dung of their flock be loſt, if not convenient to put them on a fallow. To preſerve it, they keep the ſheep at night in an open ſtable, or ſome covered place, on earth carried in for that purpoſe, 3 or 4 inches thick; and ſo encreaſe the depth, by renewing with earth in proportion as the ſheep may dung on it: this is a piece of frugality worth noticing.

I muſt here obſerve an abuſive cuſtom, when ſheep are penned on a ſummer fallow, in june, and july; the dung is left on the ground (too often) till the end of ſeptember, or october, before it is plowed-in, its fructifying juices are exhaled by the ſummer heat, and it becomes a mere dried exhauſted crumble; and when plowed-in afterwards, the ground is little benefited by it. Let any man witneſs the difference of corn from land under the above circumſtances, and from a penning in ſeptember when the dung is immediately plowed-in, with its full juice and enriching quality: this leads me to hint, whether the farmer might not find his account in collecting it on the downs, as there are places where the ſheep make choice of to lie, and a quantity may from time to time, be procured at a ſmall expence.

Woolen rags are much uſed in wet, ſtrong land; they are generally cut ſmall and ſcattered on the ground, after the wheat is ſown, and then women with a ſtick thruſt them into the ground. Woolen rags are found to be of much ſervice to ſtrong land, by their warm opening quality, and are laid on heavy land only.

Salt, a very penetrating and hot manure, is made uſe of only where it can be procured cheap; except in the caſe of deſtroying the red worm, for which it is worth purchaſing at a high price, it being the only quick deſtroyer of that pernicious enemy to corn; for which purpoſe, it will take 5 or 6 buſhels to an acre ſtatutable meaſure. This is too large a quantity to be ventured with corn on any ſoil, at the time of ſowing the ſame; it is moſt proper therefore to lay it on the ſummer fallow, if deſigned for wheat; and on a winter fallow, if deſigned for oats; but if ſalt is to be conſidered as manure, it muſt be uſed only on low, heavy, ſtrong land, and ſowed on the land with the wheat, and harrowed together, at a quantity of about 3 buſhels to an acre.

Lime, is another fertilizing manure for cold and ſtrong, either up, or low land, where the texture is cloſely united. I have known great ſucceſs from lime on hilly land, and ſome of ſuch hills very high and ſteep, the nature of which was very hard, inclinable to a clay, and a ſhallow ſtaple not worth 6 pence per acre in that ſtate; the lime was carried upwards of twenty miles at the expence of 2 s. 6 d. per barrel, or four corn buſhels, and 64 barrels allowed to one acre, being 8 £. an acre; and afterwards this land was let at 10 s. per acre *plantation meaſure* of 21 feet to the perch. Lime will break and open the ſullen clod, by its warm expanding quality; and therefore is highly adapted for cold, heavy, ſtrong ſoils: being in direct oppoſition to the nature of the land it ſo reduceth.

Soot, is alſo a warm manure, much impregnated with ſulpherous ſalts and nitrous particles, very pungent for a ſhort time, but not durable; it quickens vegetation, and deſtroys moſs for 2 or 3 years, when laid on moſſy paſture; it is a good ingredient for a dung hill, or for tillage in heavy land, and an effectual deſtroyer of the red worm.

Hog's dung, is by every account the firſt manure among the *brutal ſpecies*, and if hog's dung and neats dung could be preſerved pure without mixture, it would make the beſt in the world for a light ſöil. Hog's dung is very rich and powerful, and if mixed with the cool rich diffuſive neats dung, and covered in the earth, would affect the ſtaple of ſhallow, dry land, beyond any other: hog's hair is alſo very powerful when laid on paſture, or tillage; it is not only proper for heavy land to open the pores thereof, but is alſo of great efficacy on a warm, dry ſoil in paſture, and meadow. I muſt acknowledge my ſurprize on ſeeing the effect it produced, where it had accidentally been laid on a dry ſide of a hill of paſture land, even the courſe briſtles producing a luxuriancy ſcarcely to be credited.

Cows, or neats dung, and neats hair, are great acquiſitions in tillage, paſture, or meadow land. The dung of cows, bullocks, &c. is of a cooling diffuſive rich quality, and altho' on paſture land, where it is a thin, dried cruſt, and out of its elementary province; yet, when it is incorporated with earth, no manure can exceed its utility in a dry, hot, ſandy land, producing a general moiſture and coheſion of parts: whoever therefore is in poſſeſſion of a ſlaughter houſe, is in poſſeſſion of a treaſure, if he has the opportunity of a dry farm under tillage. Blood, hair, and ordure, with all that comes from the inſide of a ſlaughtered bullock, or pig, is an ineſtimable friend to dry, ſhallow land, and cannot be too much prized. Neats hair alſo from the tanners is of much value, either ſtrewed on paſture, or meadow land, either hot, or cold, or when tilled in.

Horn ſhavings alſo are a great warmer of land, and have great power in fructifying paſture ground and are good in a clogged ſoil under tillage.

Malt duſt, is opening, and keeps the pores of ſtrong land from adhering together; but in itſelf as manure, or enriching, it has little power: however, as malt duſt will keep the parts of ſtrong land from too great a connection, and thereby accelerate vegetation, every man who has it in his power to obtain it reaſonably, ſhould make uſe of it.

Leaves of trees, and vegetables, are the moſt permanent of all manures, eſpecially the leaves of trees; they have a rich and laſting quality, and therefore a double advantage ariſeth from laying earth over the ſurface of a rookery grove, as all the leaves of the grove can be thereby preſerved; letting the ſeaſon of taking the earth away be, as ſoon as the leaves are fallen.

The next and laſt manure I ſhall mention is not for tillage, but *paſture* and *meadow* only, and that is, horſe dung and the dung hill mixture; lay all ſuch out on the *paſture* and *meadow* land to do its office in its province. The chimney ſweeper is as uſeful in his ſable office, as the lace coated ſervant at the ſide-board. Filthy weeds rotted and all manner of ſtuff fermented together in the mixen, are in their proper province as uſeful as the delicate flowering clover, buck wheat, &c. are in theirs. Therefore, let not the farmer blend inconſiſtencies, but with propriety conduct his noble ſcience, and maintain his credit: let him not ſleep as it were, over that high ſtation in life wherein providence has fixed him; but try every experiment further to improve the firſt ſtation of univerſal good: let not one day be void of proper attention and enquiry, thus will he extend his ideas, and then bring them into the field with judgment and advantage.

Having gone through a courſe of bringing in land for tillage, and made obſervations on manures beſt adapted for the various ſoils; I ſhall now make ſome profitable obſervations on the artificial graſſes moſt worthy of notice, requeſting the farmer's attention, as it nearly concerns his pocket. And firſt on red clover.

Red clover, is a profitable graſs, and may be much more improved if the farmer ſtrictly adheres to the clean ſyſtem of tillage, and proceeds with judgment upon it.

I left the huſbandman in poſſeſſion of his land, *page* 19. after one, or two crops of wheat had been taken from it, to proceed with ſucceeding crops according to his own judgment. I preſume that he has ſtrictly obſerved my advice, in reſpect of the tillage; and that I now find ſome of his ground hath been ſown with red clover in the ſpring, accompanied with a crop of barley, and the land nearly in the ſame rich ſtate, but in a much higher tilth, than when I delivered it to him. Then in july let him ſow ſome turnips, on another part of the land, for winter provender for the ſheep and oxen, which his rich dunged land is now feeding, as well as for thoſe more profitable oxen that are in the plough: the feeding of which ſhall be hereafter ſpoke of.

The ſpring following, let him buy a parcel of ſows with pig, of a kindly breed, in proportion as three ſows to an acre, (when I mention an acre it is a ſtatutable acre:) and keep them in the farm yard on the refuſe of the winter turnips which they will greedily eat if cut into quarters, (or rather boiled and mixed with a little pollard;) as ſoon as the clover is ſtrong enough to receive them, which will be in the begining of april, put the ſows with their litters into the clover, in proportion as three ſows and their litters to one acre, which for a certainty of computation of profit, I ſhall ſuppoſe 30 ſows and litters, to 10 acres: in a warm ſheltered corner of the field, make a hovel open on the ſides, and only covered with a few furze faggots, and ſome ſtraw in the bottom for the pigs to go into and protect themſelves from heavy rains; it is not of any conſequence, whether the ſows farrow in the yard before they are put into the clover, or not, when they have that covering and ſtraw to be ſheltered in.

Theſe 10 acres will maintain 30 ſows and litters, at 8 to a litter; but I will ſuppoſe it only feeds 6 to each litter, the number is 180, excluſive of the ſows. What will the farmer ſell theſe pigs for a ſcore in october? (at which time I ſuppoſe the clover may begin to be ſcarce:) I dare ſay he will aſk £. 15. a ſcore for pigs ſo highly fed; firſt from the large quantity of milk the ſows were ſo profuſely ſupplied with in the luxuriant clover, and the full feeding they have been bred up with, without intermiſſion ſeven, or eight months; and thereby rendered one fourth larger than what they would have been, running about in the common way: I do not chuſe to make words, but will give him £. 12. a ſcore for them, one with another; and the farmer will have made a hat-full of money in ſeven months from 10 acres of land. £. 108. for nine ſcore pigs, and the ſows worth at leaſt their full coſt. Or, as ſoon as the pigs have done ſucking, the ſows may be taken away and ſpayed; an acre will then feed 6 more ſmall pigs, which will be 30 to one acre of good clover, and the pen-hurdles being made cloſe at bottom, or with wattles, there will be no danger of their getting out.

A farmer who made trial of penning large pigs on clover, found a difficulty in preventing them heaving up the hurdles; but if they were rung with a forked ring, or, the hurdles made with five bars, the three lower more cloſe than the two upper, and to lie cloſe to the ground, the pigs could not diſturb them.

One acre of good clover will maintain 18 large pigs, ſix, or ſeven months; and it is as well worth while to keep a hog-herd, as a ſheep-herd: where a man has a hundred large hogs under this manner of feeding, a few ſhort poſts ſet up in different parts of the field, will be neceſſary for the pigs to rub againſt.

Now, let us deduct for rent, on 10 acres of land, and the expence of now and then removing the hurdles of diviſion, as two acres or thereabout, will be ſufficient at one time, till the pigs are three months old; and then they may have more room, ſupplying them with water in the heat of ſummer; all

F which

which may amount to about £. 8. charges, pray in what manner will the farmer make £. 100. out of any other 10 acres? and at the ſame time, the 10 acres are really £. 30. better than when the pigs were put into it.

Hog's dung has been already ſpoken of, and therefore I ſhall not ſay more in its praiſe; but deſire the farmer to plow the ground for wheat, and ſow 64 pounds to an acre.

I ſhould have noted, in a free working good ſoil, clover ſeed, or trefoil, may be ſown to ſucceed a crop of wheat; by ſowing it the begining of march on the wheat, allowing a little more to an acre, than is uſeually ſowed. This clover ſeed may, or may not be trod in and covered, according to the nature of the ground; if it be ſtiff and moiſt, the ſeed will do very well without further trouble; but if ſandy, or light, treading the ſeed in with horſes, and rolling it well, will be of much ſervice, and even to the corn; but I hope ſheep will be excluded from ſuch duty. Sowing clover with wheat, may gain a ſeaſon to the farmer; and if he is deſirous to ſucceed with a crop of barley, his land will be much better for ſuch a crop, by plowing in the clover, before his barley is ſowed; in either caſe he looſes no time, as a winter fallow muſt enſue.

The next profitable graſs I ſhall mention, is lucern, which I am ſorry to ſee neglected;

it is not inferior to any, if not ſuperior to all, if ſowed in well tilled clean land, in the broad caſt way, as 7, or 8 pounds weight to an acre which will be leſs than 2 inches diſtance from each plant; and the ſame ſoil that ſuits red clover, will anſwer to lucern, and it may be ſowed with oats, or barley. The firſt year cut it for ſoil, or mow it twice for hay; if cut for ſoil it will yield four plentiful cuttings; in the ſouth of *France*, they cut it 5, or 6 times, it is an encreaſer of milk, beyond any other graſs; and tho' the prejudiced and ignorant aſſert, that it gives butter and milk, a bitter, diſagreeable taſte, I know the contrary from ſeveral years experience. Some people alſo exclaim againſt turnips for the above reaſons; but I aſſure the reader, I knew a very curious man feed his milch cows in the winter with turnips, and a ſmall quantity of hay, but never heard one complaint of this kind; indeed, ſome conceited perſons alſo will tell you, that mutton will taſte and ſmell ſtrong of turnips, when fed on them, but it's all whim and caprice. To preceed, lucern being cut for ſoil, or mowed for hay, or fed with pigs the firſt ſummer, I ſhall adviſe to feed pigs on it the next; by which time it will be very ſtout and early in vegetation, and this vegetation continuing uniformly thro' the ſummer, gives it the preference to red clover, for rearing young pigs.

I am convinced it will feed 6 pigs an acre, more than red clover, which makes a difference of £. 36. on the 10 acres in its favour; this is no deſpicable ſum, nor will lucern ever be neglected by the judicious. After you have fed it two ſummers with pigs, and put into your pocket £. 200. and ſo much enriched the land, plow up the lucern and ſow it with wheat, or, continue to feed it with pigs, either way the farmer will find a large account, and ſome time or other when at leiſure, thank the perſon who adviſed him to it.

Many have been kept from cultivating this treaſure, ſuppoſing it could not be raiſed in the broad caſt like red clover, but muſt be ſowed in drills with a continual trouble of tilling; but I can aſſure the farmer, he need not be under any ſuch doubts; it will thrive and flouriſh many years, without any annoyance of weeds, or graſs, in proper well prepared land; but even ſuppoſe it ſhould in a few years leſſen, as red clover does in its produce, the land is equally as fit to be plowed up for wheat, as any clover land ever was; where then is the loſs or injury! nay, I muſt further advance, that if it were only equal to clover, and of as ſhort duration, it would be but prudent in the farmer to change the rotation in graſs, as well as in corn: nor is another ſtory propagated againſt the culture of this graſs, leſs weak and groundleſs: that, in order to make it prolific, you muſt ſow it in a nurſery way, one ſpring, the next tranſplant it into rows, and ſhorten the root to make it throw out more lateral roots, and thus having a leſs depth in the ground, enlarge the crown, or head, from whence the many branches ſhoot forth. From experience, as well as reaſon, I know this to be a miſtake: as I have known it for 15 years ſown in the broad caſt, where common graſs had formed a cloſe ſod, on a dry ſide of a hill, where the common graſs in may, was often, entirely parched up, yet, through this would the lucern flouriſh, ſo that in the beginning of may, it was generally 20 inches to 2 feet high. As to natural objections I obſerve that, this graſs as well as red clover and ſaint foin, has a deep root which will not be affected by the drought, and therefore it will flouriſh in ſuch weather and ſoil, when the common, or ſuperficial rooted graſſes are languiſhing and burnt up: thus we ſee the deep, or tap rooted graſſes, lucern, red clover, and ſaint foin, whoſe roots are perhaps, 3 feet or more, flouriſh not from any magic virtue in thoſe ſorts, but from an eaſy accountable cauſe, which the advocates for tranſplanted lucern directly oppoſe.

Tranſplant it ſay they, and cut off the tap root, this will prevent it from rooting deep, and cauſe many lateral and ſuperficial roots, and thereby add ſtrength to the plant: pretty reaſoning this; deprive nature of that ſupport which it had given to the plant, as the only protection againſt the burning element! I wonder much why theſe abſurd gamblers in vegetation, have not told the farmer his clover would be more prolific if the tap root was taken off; and the gardener, that if he intends to make a flouriſhing and luxuriant wood of oak, he muſt ſow the acorns, tranſplant and cut off the tap root, which nature has given to that majeſtic tree, to ſupport its weighty and extended head.

Saint foin, is another luxuriant graſs; and has ſtill a more excelling quality than either, as it will proſper in a more dry, and flinty ſoil, and yield an abundant crop for ſoil, or hay; it may be ſowed in the ſame manner as the before mentioned ſorts; too much cannot be ſaid for this graſs, it is equally fertilizing with buck wheat if plowed in for manure, and the beſt hay for ſheep in the winter: nor do I doubt but it will anſwer well to rear pigs on; at leaſt I moſt heartily recommend a trial, and if it anſwers that end, it is eaſy to conceive what a rich ſtate ſuch poor flinty land may be brought to.

Rye or ray graſs makes a very courſe hay, but is early for ſheep, and at ſuch time, the blades are tender and ſweet; this is good for low ſtrong land, where the paſt mentioned luxuriant graſſes will not thrive.

Timothy or the Ohio graſs is of much the ſame nature, only more ſtrong; it ſtocks or branches out from the root much more than ray, but is harſher when made into hay; it is always ſown in ſwampy ſoils, when the water is well taken off the ſurface.

Trefoil is an exceeding good graſs for hay, perhaps the firſt, conſidering its ſweetneſs, earlineſs, produce, and the delicacy of the ſtalk, and agrees beſt in a dry ſoil.

White meadow graſs is much preferable to ray, or timothy graſs, being a more kind and tender hay for common meadows than either.

Having gone through a ſhort account of the moſt uſeful graſſes, I ſhall now give ſome directions by way of improvement of paſture, or meadow land, when the farmer lays out his dung.

Juſt before the dung is laid out, the land ought to be ſcored, as it is ſo called, with a ſcarificator, a plough made for that purpoſe, which makes five ſcores, or cuts, about four inches deep, and three inches from each other, with one horſe; each ſcore is juſt as if a harrow pin had been drawn along the ground. When the dung is ſpread, much of the ſmall parts of it will enter theſe cuts; and the nouriſhing juices will mingle better with the earth, and improve the graſs and ſoil more, than when the whole is kept on the ſurface: which is no ſooner wet, but dry, by this method of ſcarificating the ground it is otherwiſe, the ſcores are receptacles for rain and moiſture, and are as ſo many ſmall ditches to receive and hold whatever runs into them; I muſt acknowledge that I think it carries its merit with it on a bare idea, but am ſure when the farmer puts it in practice, he will be convinced of its utility equal with the writer; and when ſloping fields are to be ſcored, or ſcarificated, it muſt be croſs ways, not up and down.

Thus, having gone through a ſhort account of manures, I ſhall take the liberty to give the farmer the opinion of ſome writers relative to froſt and ſnow, ſo far as it may appear to fall in with winter manure. Froſt being only an exceſſive cold ſtate of the weather, whereby the motion and fluidity of liquors are ſuſpended, is therefore not acknowledged by any writer, as having any fructifying quality, but is of ſervice only, as it opens the earth, and thereby admits the air to enter and pulverize the ground, and as it dries heavy, wet land, when it continues any time without rain.

Snow is mentioned by ſome, as containing abundance of fructifying ſalts, and on very miſtaken principles, is accountd a bleſſing to the farmer, when plenty in the winter. Snow ſays the learned, is a vaporous meteor, formed in the middle regions of the air, raiſed by the action of the ſun, or ſubterterraneous ſire; there congealed, its parts conſtipated, its ſpecific gravity increaſed, and thus returned to the earth in little villi or flakes.

In plain terms, ſnow is nothing more than rain congealed in part of the atmoſphere, thro' which it falls, and if part of the atmoſphere is warm enough to diſſolve the ſnow before it arrives at us, we call it rain; if it preſerves itſelf undiſſolved, we call it ſnow.

The ingenious gardener *Mr. Miller* ſays, like many others, ſnow is uſeful; that it fructifies the ground, guards corn and other vegetables from the intenſer cold of the air, eſpecially the piercing winds. That it abounds with ſalific and fertile particles, as much, or more than rain; however, it is accounted more ponderous, and by that means ſinks deeper into the ground than rain.

Chambers, in his *Univerſal Dictionary*, after giving us the philoſophical definition, comes to the uſes of ſnow, and furniſhes us with a ſufficiently curious account of them. If all be true ſays he what *Bartholin* has ſaid in its behalf, the uſes muſt be very great; as it fructifies the earth, preſerves from the plague, cures fevers, cholics, tooth-aches, ſore eyes, and pluriſies, for which his countrymen of *Denmark* uſed to keep ſnow-water gathered in march. He adds, that it contributes to the prolongation of life, giving inſtances of people in the alpine mountains, that live to great ages; and to the preſerving of dead bodies: inſtances whereof he gives in perſons buried under the ſnow in paſſing the alps, which are found uncorrupted in the ſummer, when the ſnow is melted.

He obſerves, that in *Norway*, ſnow-water is not only their ſole drink in the winter, but ſnow even ſerves for food; people having been known to live ſeveral days without any other ſuſtenance. Indeed the generality of theſe medicinal effects of ſnow, are not to be aſcribed to any ſpecific virtue in it, but to other cauſes. It fructifies the ground for inſtance, by guarding the corn and other vegetables, from the intenſer cold of the air; eſpecially the cold piercing winds. And it preſerves dead bodies by conſtipating and binding up the parts, and thus preventing all ſuch fermentations, or internal conflicts of their particles, as would produce putrefaction.

Be theſe accounts founded in truth, either in part, or the whole, nothing ariſes from them to convince us, that ſnow has any intrinſic fructifying quality; and I am ſure, the doctrine of a modern writer, is exceedingly abſurd who, has aſcribed ſuch virtue to it. He adviſes a conſtant attention to keep dung-hills covered with it thro' the winter, by throwing up a large quantity on them, whenever it falls. Snow has a ponderous property, and therefore worſe for low ground than rain, and if it did not cover and protect the corn from piercing winds, it would be injurious to ſuch land: it has no more ſalific, or fertile particles than rain, and at beſt, can be conſidered only as a protector of vegetables.

Thus, have I endeavoured faithfully to anſwer my engagement of increaſing the farmer's purſe, and improving his land, in an eaſier manner than what he had been accuſtomed to. I ſhall now beg the farmer's leave to depart a little from the trodden path once more, and offer ſome obſervations and hints, towards a further improvement in a new road of huſbandry, at leaſt unknown to many, who may be readers of this treatiſe; and ſhould he refuſe to try it even in ſmall experiments, it will not hurt him to read the proceſs: the ſame principles which firſt actuated my pen, continue to make it flow.

I told the farmer land was very obedient if judiciouſly treated, and the more care he took of it, the more gratitude he would receive from its flowing veins. I left it in his poſſeſſion in good order, juſt as he had taken one, or two crops of wheat from the new broke up land, page 19. I will reſume the ſubject at the ſame place, and wiſh him to attend to the profit on the method he has purſued ſince I put it into his hands, and what I now ſhall offer to him.

As ſoon as the crop of wheat is cleared from the field, roll it on the ſtubble, when it is dry, with a ſpike roller; this will break and divide the ſurface which has laid hardening from many circumſtances ſince the laſt wheat was ſown, and therefore the top muſt be much harder than the bottom; and as this hard top, or ſurface, is to be undermoſt in the next plowing for winter fallow, it will be neceſſary for the good of the tilth, that this ſhould not be turned over to lie in that clogged hard ſtate: the ſpike roller you ſee will prevent that, as it ſeparates the parts before the plough turns the ground over; the whole then lying in a looſe open ſtate, the wet of the winter is more freely diſcharged. It being now plowed and under a winter fallow, ſow it with barley and clover, the enſuing ſpring, 1770, from which time my calculation begins; feed it with 180 young pigs and 30 ſows. The next ſeaſon ſow it with wheat, after which give the land a winter fallow, and ſow it in the ſpring 1772 with barley and lucern. In april 1773 feed the lucern with 240 pigs and 30 ſows, as lucern will feed 30 ſows and 8 pigs to each litter on 10 acres: and ſo proceed for 10 years according to my calculation, or as much longer as you pleaſe; with this alternate rotation, you may continue till your pockets overwhelm with wealth, as your land will with richneſs.

As under, the whole proceſs is moſt accurately ſtated for 10 years, on 10 acres, as near to a computation as it can admit; beginning with 1770.

A calculation on 10 *acres for* 10 *years.*

	£.
Clover ſed with 180 *young pigs and* 30 *ſows, at* 12 *s. each, from april to october* 1770, 6 *months.*	108
Wheat from october 1770 *to auguſt* 1771, 10 *months.*	100
Fallow from auguſt 71, *to april* 1772, 8 *months.*	
Barley and lucern from april to auguſt 1772, 4 *months.*	50
Lucern under the winter from auguſt 1772 *to april* 1773.	
Lucern under 240 *pigs and* 30 *ſows from april to october* 1773, 6 ***months.***	144
Lucern under the winter from october 1773 *to april* 1774.	
Lucern under 240 *pigs and* 30 *ſows from april to october* 1774, 6 *months.*	144
Lucern under the winter from october 1774 *to april* 1775.	
Lucern under 240 *pigs and* 30 *ſows from april to october* 1775, 6 *months.*	144
Wheat from october 1775 *to auguſt* 1776, 10 *months.*	100
Fallow from auguſt 1776 *to april* 1777.	
Carried forwards.	£. 790

	£.
Brought forward.	790
Barley and ſaint ſoin from april to auguſt 1777, 4 months.	50
Saint ſoin under winter from auguſt 1777, to april 1778.	
Saint ſoin under 240 pigs and 30 ſows, from april to october 1778, 6 months.	144
Saint ſoin under the winter from october 1778 to april 1779.	
Saint ſoin under 240 pigs and 30 ſows from april to october 1779.	144
Wheat from october 1779 to auguſt 1780, 10 months.	100
Or on 100 acres in one year. £.	1228
Or on 100 acres for 10 years, £.	12280
Profit on 100 acres in 10 years, £.	12280--00
Deduct expences as hereafter allowed,	1203--05
Neat profit from the land. £.	11076--15

By the above calculation the amount of 10 years proceſs is 12 l. 5 s. 7 d. yearly on each acre, and that with the leaſt expence; and not only 10 years, but ten times ten will hold under the ſame rule. Now let the farmer give us his manner of tillage, and ſtate his profits, if the expence be leſs, profit greater, and the land made more fertile, I will moſt gladly ſubmit, and commend his adherence to the good old path;

but if it does not appear ſo, my obſervations hold good; and I would add for his further comfort, that I ſincerely believe near 1500 pounds might be made by the above proceſs.

However, I have not quite done with my new path, or more properly a broad turnpike road, ſmooth and eaſy to travel on, and room for waggons to bring home the treaſure: let the farmer have done with the expenſive horſe, and cheriſh the profitable ox. The accidents, maintenance, ſhoeing, and decay of horſes, are heavy articles, whereas, the maintenance of the ox is eaſy, the expence of ſhoeing him ſmall, even when the ground is ſtoney; and if an accident attends him, he is not loſt: moreover, every day of duty encreaſes his value till he can labour no more. Hence I may ſay the compariſon will be as a dead horſe to a living ox.

In the courſe of this treatiſe, I have informed the huſbandman how he may make a poor farm rich, or any part of a farm not naturally equal with others, by bringing in ſuch with vegetable manure, ſo as to make it fit to produce clover, lucern, or ſaint foin, which when done, the pigs afterwards are the treaſure to enrich the land to almoſt any high ſtate; and when arrived to this perfection, the paſt calculations may ſerve for his conduct; or if he will be obſtinate and like an owl, be blind in the midſt of light, he muſt not complain, or repine at providence. I ſhall now make a few profitable remarks, on ſome things I have mentioned. And firſt, encourage paſture with your dung, I know many are bound up from plowing paſture, which if prudently done, and laid down again after a few crops, would make ſuch paſture double its value; and therefore, the farmer is to make the moſt of it in its natural ſtate, and enrich it for his own ſake as much as he can with dung; by this he will be enabled to rear more calves, and make an additional profit.

Secondly, keep no more land under tillage than you can properly attend, 100 acres on my ſyſtem will produce in groſs a ſum not leſs than £. 1228 each year, page 54. or £. 12280 in 10 years. The expence of tilling this 100 acres, is but very ſmall, as are alſo the harveſtings, which for your ſatisfaction, you will find explained hereafter. In the 10 years proceſs there are 5 plowings of the whole land, that is 3 of wheat, and 2 of barley, and the ſame harveſts, and 6 ſummers under pigs. I do not mean to ſtint a farmer to 100 acres only, under this proceſs the more he has the greater will be his profit; but I mean, that no man ſhould ſo encumber himſelf, from a deſire of being the great farmer, as to become a ſloven over any part of the land which he occupies, and which ſo far as neglected, muſt from its expences be a real loſs to him.

I have mentioned what you ſhould do with your dung and its uſe, but I do not lay it down as a rule for the farmer to go into a grazing ſyſtem; for tillage land, and grazing land, are two diſtinct and oppoſite farms: a grazing farm, and a corn farm, are very ſeldom united, each being a diſtinct province. I mean however, that on his paſture he ſhould raiſe calves for the graziers, their land is too valuable to rear young cattle on, they go abroad, and buy at the fairs 2 and 3 years old bullocks, &c. and then ſwell them up on their ſtrong paſtures which are natural, and not made ſo by art. In order to render your paſture land more fit for the purpoſe intended in the ſummer for young cattle, I have recommended the uſe of dung; I ſhall now tell the farmer what he is to do in the winter to advance this young ſtock, ſo as to make it as profitable (with his induſtry) as may be.

In part of the farm I adviſe him to have turnips for his ſheep, or rather turnip rooted cabbage, it being of a more ſolid ſubſtance than turnips; and it is much remarked by thoſe who have uſed it, that the dung from black cattle (as all cows and bullocks are called) is of a firmer conſiſtence than what is produced from turnips, and therefore the nouriſhment of this food is accounted greater. This may be ſowed in well tilled ground in april, 3 pounds weight to 1 acre, hoed as turnips are hoed, and according to the goodneſs of the ground ſet off from 10 to 12 inches ſquare at leaſt, each acre will produce 43560 plants at 12 inches ſquare, and at 6 pounds weight one with another, is 261360 pounds weight, or 116 tons, 13 hundreds and 64 pounds. Each of the 2 and 3 years old bullocks, or heifers, in the field will eat about 120 pounds in 24 hours, carried on paſture and properly cut into pieces; ſo that 1 acre will maintain 15 in the field 5 months, that is, thro' november to the 1ſt. of april. If theſe ſtore fed cattle ſhould be kept in the farm yard, or any where that ſtraw may be given to them in cribs, 84 pounds weight of turnip rooted cabbage, and 40 pounds of dry ſtraw, is as much as each can eat, which will feed 20 in the 5 months: and where milch cows are fed in this manner in the winter, it is the full allowance. Stall fed bullocks for fattening, have an allowance of half their weight every 24 hours given them of the above food, for inſtance, if a bullock weighs 600 weight, he will eat near 300 weight of ſuch food; 1 acre will feed 7 bullocks of that weight 5 months. Sheep will conſume from 15 to 20 pounds weight according to their ſize in 24 hours, ſo that 1 acre will maintain from 81 to 124 ſheep 5 months. In much the ſame proportion of turnip rooted cabbage will bullocks and ſheep eat of turnips. The working oxen in their reſt after labour, will eat full as much as the ſtore cattle, for although they have but leſs time, yet they eat more voraciouſly.

Turnip rooted cabbage being not much known, I ſhall therefore deſcribe it. The root which is the principle food, grows entirely out of the ground, rather oblong upwards, than flat like turnips on the ground, and only a long root into the ground for its ſupport; on which account it is clean and free from earth, which turnips often are not: the cabbage part does not gather together into a cloſeneſs like cabbages, it is called ſo from the leaf reſembling a cabbage leaf, but it is as good food as the tops of turnips: the root is not of ſo watry a quality as turnips, and it is a general remark, that cattle fed with this root, dung more, and make leſs urine than thoſe fed on turnips; moreover, if ſheep in the field eat but part of one at a time, the remainder does not decay and rot as the turnips do: they will alſo keep perfectly good and ſound till the end of may if the tops are cut off cloſe, and the turnip part throwed together in heaps; and be equal as good in may, as in march: the cattle are alſo full as deſirous to eat the tops as they are turnip tops; ſome ſay, much more ſo, becauſe they are of a much more ſmooth and ſopey ſubſtance: my calculations are from the root being diveſted of the ſlender part which runs into the ground, as alſo of the tops, or leaves: the leaves are to be given to the cattle by themſelves.

The manner of giving turnip rooted cabbage, or the common turnips to black cattle, or pigs, is to cut them into quarters, four or eight, according to the ſize of the root; but if cut too ſmall they may ſwallow the piece whole and endanger a choaking: and where theſe roots, either one or the other are given to black cattle, the farmer generally has a quantity brought home, and the ſervants cut them in the kitchen at night with a knife, unleſs provided with a machine conſtructed for that purpoſe.

The great advantage of feeding black cattle with either ſort, is the enlarging and ſwelling them in ſize; in which it has indeed a good effect, and is much cheaper than hay: I think the firſt idea of it carries a conviction to every man, who acts on impartial principles, as every one is perfectly and experimentally convinced, what effect vegetables have on cattle; and how much to their well being it muſt be, that during the locked up face of the earth, where there is no vegetation of graſs, or common nature in the field for their ſupport, but kept alive only as I may ſay with dry harſh ſtraw, or hay, (and if good, I am afraid they get but little of the latter) they have then the nouriſhing vegetable to keep them in a prominent ſtate all the winter, that they may extend themſelves in a proportionable degree in the ſummer. I have before obſerved to you in the caſe of manure, where one part of the country perhaps had not ſuch, as other parts of the country poſſeſſed; that there was manure ſuitable to improve their land, within itſelf, if they would look for it; as providence has kindly furniſhed a ſubſtitute for man's comfort: ſo here, when all the ſummer's luxuriancy of clover, lucern, ſain foin, &c. &c. is gone, and dead as it were, no more to be found for the mooing cow, or the bleating ſheep, providence has given other living vegetables, and ſubſtituted as it were a new frame of ſupport, which inclemency of weather cannot deſtroy: ſuch vegetables are the turnip rooted cabbage, the common, or field turnip, burnet the ſmall or garden kind, and the cabbage ſpecies of different ſorts.

As to peaſe and oats, neither of which has been mentioned, I ſhall leave them to the farmer's own thoughts; if he can turn the land to more profit by ſowing either, it is adviſable he ſhould do ſo; but I hope he will not ſow oats for horſes, if he ſows peaſe for fattening his pigs; his oxen will not require ſuch expenſive food, their ſupport is much cheaper and better adapted.

Thus, I have given a ſhort account of tillage, ſome hints perhaps may be uſeful to ſome perſons, and the whole may be a general hint to others to improve on; for we muſt not miſtake the meaning of *Solomon*, where he ſays, "there is nothing new under the ſun," that being metaphyſically ſpoke relative to the knowledge of God: ſhort ſighted man is always ſeeing, but can never ſee; always learning but never learned.

Before I quit the field, I ſhall offer an obſervation or two on the ſowing wheat in the ſpring, and oats in october, or november: ſtrict attention ſhould be had to the following rules. If land is wet and heavy, it ought never to be plowed, or ſowed in wet weather, or at any other time plowed in wet weather, or when it is in itſelf wet: ſuch land ſhould be plowed when dry, and lay till the ſeaſon for ſowing the wheat; it may be plowed in auguſt, and left in the rough till the beginning of october, and then ſown and harrowed. If this was obſerved, the farmer would always ſow ſuch land in due ſeaſon, and in ground proper to receive the ſeed; if on the contrary, part of the land be hot and dry, I would not ſow it till october, or november, and ſo do the work on the heavy wet land firſt.

And here let me mark the impropriety of eating down wheat with ſheep; for be aſſured if wheat be not ſown too thick, it will not be too forward, having room to ſtock and ſpread, which many inſtances have proved: ſome tell us 6 grains put in at one foot diſtance, produced 174 ears, containing 5710 grains; which from the ſize of wheat weighed 10 ounces: others affirm they have had 41 ears from one grain, each ear 7 inches long, and 100 grains in each ear, 6 ounces from one grain. However large theſe accounts may be, I am very certain a much greater encreaſe, and finer wheat may be produced by due attention to tillage.

Further, as to ſeaſons of ſowing wheat, the farmer ſhould not deſpair if his wheatland has not all been ſown in the uſual courſe of time, as he may ſow even through february; many good crops have been obtained from ſuch ſowing.

As to oats, particularly black oats, I am ſatisfied from many experiments, they ought to be ſown in november in dry land; as they are equally hardy with wheat to reſiſt the winter, and then will never ſuffer from an enſuing dry ſummer.

Dril tillage is a very agreeable amuſement, and anſwers in ſome fine ſoils, but I am very doubtful from what I have heard even from the advocates for this tillage, that it will not profit the farmer; if it does not, it is of no utility to trouble him with it: my aim is to point to the center; to this uncontroverted ſyſtem, whereby a man ſhall moſt improve his land in the cheapeſt manner, enrich himſelf, and go ſmiling to his landlord; any other ſyſtem of agriculture is mere wind.

Having mentioned ſome other vegetable winter food for black cattle, ſuch as burnet, and ſome cabbage kind, ſome account of them may be expected.

Burnet is an old ſtandard in the garden for cool tankards, as giving the liquor a flavour, and thought to be good for the head; there are two ſorts which naturally grow in *England*; the one is found wild on the ſides of many dry hills, where it is but a ſmall plant, but when brought into the garden, or field culture, it grows to a large crown, or head, and produceth a great number of leaves, which grow, or adhere to the ſtalks by pairs, therefore called *Pimpinella* for *Bipinella*: The other, or wild meadow burnet, does not claim our attention: but the firſt is much in vogue; it was accidentally introduced into field culture, by a premium of *Fifty Guineas*, offered by the *Society of Arts and Manufactories*, to the perſon who, ſhould diſcover a graſs that vegetated in the winter; a gardener near *London* preſented this burnet as a vegetating winter graſs, and obtained the premium: ſince which many perſons have run burnet mad, as ſuppoſing it to have been endowed with ſome ſupernatural property to vegetate in the winter, as in the ſummer; but this is mere partiality, or miſtake, there being in all herbs, ſome degree of vegetation: burnet however, being ſtrong before the winter, defys the moſt ſevere ſeaſons, and is in february and march a fine crop, tho' of little uſe in the ſummer feeding for heavy cattle; as the head, or crown, from which the many leaves ſhoot, ſtand above ground ſo high as to be broken and bruiſed by their feet: it is propagated in a manner of tillage, ſo as to make it reſpectable, by ſowing it in drills at 2 feet diſtance in good ground, and kept free from weeds with the one horſe plough-hoe, then cut and given to the cattle in the ſtalls. In leſs graſſy dry ground, its vegetation in the ſummer is nothing to clover, &c. &c. &c. and in the winter from november to april not half equal in uſe to the common field turnip, or turnip rooted cabbage.

The other ſorts of winter vegetables are the cabbage ſpecies, of which two only are worth mentioning, the large dutch cabbage, and large curled leaf ſcotch kale, or as ſome call it the *Siberian Borecole*.

They are ſown in autumn, and having a rich well tilled piece of ground ready in march following, the plants ſhould be ſet in rows 4 feet a part, the plants 2 feet diſtant in the rows which will be 32 plants to each ſquare perch; thus, one acre will take 5120 plants, and allowing 10 pounds one with another, produce 51200 pounds weight, or 22 tons, 17 hundreds, and 16 pounds.

Mr. Baker, who has been curious in experiments, finds a bullock of 5 C. weight will eat about 168 pounds of cabbage in 24 hours; in this proportion one acre of large dutch cabbage will maintain only 5 bullocks 61 days, (far unequal to turnip or turnip rooted cabbage,) and for this poor ſervice an acre is occupied a twelve month, and has three plow-hoeings in the ſummer, or two plowings with the cultivator.

The other ſort is the ſcotch curled leaf kale, or *ſiberian borecole*. This muſt be plowed in the ſame manner, or horſe-hoed as the dutch cabbage: it does not cabbage as the other ſort, but grows to a prodigious head of large curled leaves, and ſtands the ſevereſt winter without being injured; it has been much uſed for feeding of black cattle, or ſheep in the winter, but will not produce more advantage than the dutch cabbage: and indeed I ſee not any room to recommend either, preferable to the before mentioned profitable turnip kinds.

I ſhall now trouble the farmer with a few obſervations on the broad caſt, or common, and the drill tillage.

If in the latter, wheat planted, or the

ſeeds drilled in with the drill plough, 6 inches diſtance in the row, and at one foot diſtance row from row, will take 33 ſeeds in one perch in length, and 33 ſeeds in two perches breadth, 1089 grains of wheat to two perches of ground, near one ounce and nine drams of wheat, produce a given quantity: there is not the leaſt doubt but wheat evenly ſowed in the broad caſt, at 6 inches ſquare, which will take double the quantity of grains, *viz.* 2178 to two perches, being in weight nearly three ounces and two drams, will produce a double quantity of wheat: no material advantage ariſes by fixing a diſtance between the plants beyond a neceſſary ſpace, which the drill plough introduceth; on the contrary, if wheat is ſowed too thick, it will not yield the proper produce: ſo that from one extreme the diſſidents often run into another, it was abſolutely neceſſary to make a reform in the mode of quantity, but ſuch ſhould be regulated by experience and reaſon; where man will not make uſe of ſuch he muſt continue in darkneſs; if he happens to be right, ſo far it is well: but he is ſtill in darkneſs reſpecting the cauſe.

The quantity of wheat to ſow one acre in the above mentioned drill ſyſtem, amounts to 87120 grains, or 7 pounds 12 ounces and half; and if that acre had been ſown in the broad caſt at 6 inches diſtance, the quantity

of

of ſeed would have been 174240 grains, equal to 15 pounds 9 ounces, ſo for the ſaving of 7 pounds and 12 ounces of ſeed, you loſe half the produce; this is bad conduct on the one hand, as is the common method on the other of ſowing 128 pounds and receiving but a poor crop, inſtead of ſowing 64 pounds weight: which ſaves one buſhel of ſeed per acre, and gives one fourth more of profit. ----- The following original table, will give the huſbandman ſome idea in reſpect to quantity and diſtance, whereby he will be enabled to judge of my advice, and the conduct he is to purſue.

A Table of the quantity of wheat it will take to ſow one acre, from 1 inch ſquare in diſtance of grain, to 12 inches.

Square inches.	*Quantity of wheat.*			*No. of grs.*
	lbs.	*ozs.*	*drs.*	
1	560	00	14	6272640
1 and half	254	11	15	2853180
2	140	00	03	1568160
2 and half	108	01	05	1132560
3	62	03	10	696960
4	35	00	00	392040
5	22	04	14	252648
6	15	09	00	174240
7	10	14	03	121968
8	8	12	00	98008
9	6	14	10	77440
10	5	07	02	60984
11	4	10	10	52272
12	3	14	03	43560

I have allowed 700 grains of wheat to 1 ounce in the paſt table, as being a medium between 600 grains to 1 ounce ſuperfine wheat, and 800 grains in common wheat.

Here the farmer may at once ſee, according to the quantity he ſows, if evenly divided, what diſtance his plants of wheat will be from each other, if the grains are ſound; for inſtance, if he ſows 560 pounds to one acre, the plants will be at one inch diſtance; if he ſows 62 pounds to one acre, his plants will be 3 inches ſquare from each other, which I am inclinable to think is not ſo good a diſtance in well rich tilled land as 4 inches; being convinced, if a field of wheat was in the ſame ſtate of ſtocking out from the root, as two plants are, which ſeed I put into undunged ground this ſpring on the 10 th. of april 1769, they muſt be much enlarged even at 5 inches diſtance: but as I have obſerved, the quantity muſt be guided by the quality of the ground, ſo no exact quantity can be mentioned; and I conclude with requeſting the reader to prepare his land in ſuch a manner, as never to ſow more than 64 pounds of the pureſt wheat, or leſs than 35 pounds.

Permit me a few remarks on the whole.

Never plow wet land in wet weather, much leſs harrow in ſuch, or when it is wet in itſelf.

In all manuring, oppoſe heavy to light,

and light to heavy.

Sow your corn in dry weather.

Make your tilled ground rich with vegetable manure, avoiding dung.

Enrich your paſtures with dung, that the bullocks hides may be looſe on the fleſh, and the hair lie ſmooth.

Inſtead of the expenſive horſe, take the profitable ox for your plough.

Rear ſtrong food on your clover, &c. for the poor of the land, and fill your cheſt with treaſure.

Plow deep by degrees, and manure as you deepen.

Sow wheat early both in wet and dry land, for fear you ſhould not ſow the wet land at all; and to eſtabliſh your corn in the dry ground.

Never put off till to-morrow, things that can be done well to-day.

Sow ſparingly, that you may reap plentifully; and till no more land than you can till well.

I ſhall now give the farmer a recipe for brining his wheat, to prevent ſmut, as we have it in *Chambers*.

" *Mr. Bradley* makes no doubt to call
" ſmut a blight, and to account for it on
" the ſame principles as the blights befall-
" ing other plants, particularly fruit trees,
" *viz.* from innumerable little inſects brought,
" or at leaſt hatched by the eaſtern winds,

" prey on, and devour the native juices of " the corn, and poiſon them with a mix- " ture of their own.

" An approved method to prevent the " ſmut, *Mr. Bradley* gives us as follows; " the wheat for ſeed, to be waſhed in three, " or four waters, ſtirring it well round, and " with great force each time, and ſkim- " ming off all the light wheat ſwimming " at top. This done, it is to be ſteeped in a " liquor thus prepared: into a ſufficient " quantity of water, put as much ſalt as " will when ſtirred about, make an egg " ſwim, and to this add as much more ſalt, " ſtir the whole well, and to the brine, put " two, or three pounds of allum beaten fine. " In this mixture, lay the wheat to ſteep, " at leaſt 30, or 40 hours; take it out the " night before it is to be ſown, and ſift ſome " ſlaked lime on it; this drys and fits it for " ſowing. Note, many ſteep their wheat in " brine, and yet have ſmutty corn: the rea- " ſon is, that they do not make their brine " ſtrong enough, or do not let their wheat " ſtay long enough therein: it is a common " notion among them, that ſteeping it ſo " long, rots the grain; but experience ſhews " the contrary".

Mr. Mortimer obſerves a conſumption, as he terms it, is often the cauſe of blights, proceeding from the failure of the nouriſhing juices, or from obſtructions of the veins and roots; or ill digeſtion of humours, &c. as alſo mildews, a kind of epidemical diſeaſe, moſt frequent and fatal in the ſpring ſeaſon. It is properly a corroſive and nipping dew, proceeding from pent up vapours now exhaled, and returned back on the tender plant. A thick fog ſays another author, or too much dew, occaſions the ſame diſeaſe as a mildew, only in a leſs degree.

Mr. Miller ſays, blights more frequently happen in cloſe plantations where the ſtagnating vapours from the earth, and plentiful perſpirations from trees in an orchard are pent in, for want of a free air to diſſipate and diſpel them; this more frequently happens ſays he, in ſuch cloſe plantations, than thoſe that are planted at a greater diſtance, or one not ſurrounded with hills or woods. This directs us ſays he, in the firſt planting of orchards, &c. that we ſhould allow a greater diſtance between the trees, and make choice of clear, healthy ſituations, that the air may freely paſs between the trees to diſſipate thoſe vapours before they are formed into large volumes, whereby the circumambient air will be free and clear.

Several remarks ariſe from a view of theſe accounts.

Mr. Bradley we ſee poſitively inſinuates that his ſteep is an effectual preventive of ſmut, as he takes it for granted it would not fail, if made ſufficiently ſtrong, and the wheat even to ſtay long enough in it. How far ſuch ſteeping may be a neceſſary precaution I will not abſolutely pronounce, but propoſe my ſentiments with candor. He is undoubtedly right in not ſuffering any light immature wheat, to be in the ſeed bag, and I think alſo a ſteep of wheat, impregnated with brine, with a ſurrounding lime as a manure carried with each grain into the ground, will forward vegetation at the firſt on-ſet; but I have no idea of its effects, continuing to prevent blights, or ripen the grain. The like doctrine has been advanced, relative to the preſervation of turnips from the fly, when the plant is young, by ſteeping turnip ſeed 24 hours in a ſtrong infuſion of ſulphur; that the ſeed would be ſo impregnated with the ſulphur, as to carry its imbibement into the leaf: this comes within comprehenſion, yet it has no effect; I have experienced the contrary, and conclude from clear analogy, that the impregnated ſteep is as void, ſo far as it relates to ſmut in wheat.

Mr. Mortimer's way of accounting has ſome foundation; where ſubſtance is wanting to invigorate and nouriſh the juices, (as I have obſerved on ſhattered conſtitutions) heavy dews and fogs catch hold of the depreſſed plant, and ſo form a real diſeaſe, juſtly called epidemical. I need only remind the farmer to reflect on many ſuch cauſes, which muſt be freſh to him in the courſe of his labours; how often are turnips in poor ground infected, when pretty large in the ſummer; not with a turnip fly, but with a little green fly. Caterpillars alſo lay hold of weak fruit trees, and a worm and fly on cabbages in poor ground, much more ſo than on the robuſt and ſtrong.

On the whole, *Mr. Miller* appears the cleareſt on this queſtion, and I am happy in the agreement of my own obſervations with his very rational ideas of the cauſe of blights. Where foul air is ſhut up and ſtagnated, the tender ear is ſeized with the acid vapour, and the delicate bloſſoms are cruelly pierced with it, hence ariſes the diſorder of ſmut in wheat. There is a perfect analogy in animal and vegetable life, as the lungs of man are the vehicle of breathing; and according to the purity of air, ſo much more or leſs will he be in health. So the life of vegetables depends entirely on imbibing and tranſpiring, which are uniformly carried on as the motion of the lungs; and the plant is affected by imbibing foul air, as man by breathing ſuch in thro' the paſſage of the lungs; equal alſo is the tranſpiration in plants, with the out breathings of man: being ſtopped a diſſolution follows. Suppoſe a number of men ſhut up in a ſmall room, without any reaſonable ſupply of freſh air, how long could they live under that circumſtance? The viſcid air would ſoon clog the lungs, and introduce diſorder and death.

Therefore give your corn room to grow, let the air have freedom to each ſtraw and leaf, which will ſwell more, or leſs, according as it has more, or leſs, of this only and original ſupport of vegetation and life; too thick corn carries its ſentence with it, and we need not look out and ſearch for cauſes, when we carry it in our hand, in the diſtribution of the ſeed.

The expences attending plowing &c. of 100 *acres for* 10 *years as mentioned page* 54.

	£. s. d.
Rent of 1000 *acres at* 15 *s. per acre.* - - - - - - - -	750---00---00
For plowing 500 *acres at* 7 *s.* 6 *d. per acre.* - - - - - - -	187---10---00
For 19 *loads and* 13 *buſhels of ſeed wheat, at* 84 *pounds to each acre,* 300 *acres at* 10 *£. per load.*	93---05---00
For ſeed barley for 200 *acres* 4 *buſhels to one acre, at* 20 *s. per quarter.* - - - - - - -	50---00---00
For reaping 300 *acres of wheat and binding at* 6 *s.* 6 *d.* - -	97---10---00
For mowing 200 *acres of barley and cocking it at* 2 *s.* 6 *d.* -	25---00---00
	£. 1203---05---00

Note, If the true quantity of wheat is only ſowed, there will be a ſaving of twenty pounds weight to one acre, or 2 loads, 13 buſhels, on 300 acres.

Thus far I hope our obſervations agree with tht character of the *Rational Farmer*, proceeding on experience, and conſulting his intereſt: an intereſt while connected with the ſocial virtues which he cannot be too aſſiduous to cultivate. While many occupations tend only to uſeleſs ſplendor, or lazy pride, the farmer in every inſtance of his diligent employment, is a public benefactor, and confirms the truth "Self love and ſocial are the ſame".

In this view I ſtill trouble him with my remarks, only aſking pardon for inaccuracies in their arrangement.

Rolling turnips frequently after the dew has fallen, preventeth the flies from injuring them, as they are then out on their feed from under the clods, where they protect themſelves in the day; being thereby diſturbed and many deſtroyed in the rolling: this account I received from a Gentleman, who often ſaved his turnips, after he had obſerved that the fly had begun on them.

I muſt alſo mention a very intereſting circumſtance, which a reputable farmer in the *Iſle of Wight* communicated to me this ſpring 1769, he had wheat on a dry, light ſoil, during the winter he ſaw his wheat decaying; on ſearching the ground, he found many ſmall white worms, with a red head, about three quarters of an inch long, and the ſize of a common knitting needle: theſe worms during the winter and ſpring, had ſo deſtroyed the wheat, that in march the plants were reduced to a thinneſs, from 8 to 12 inches or more diſtance from each other. The farmer at this time put 4 horſes (2 a breaſt) into a roller, and rolled and trod the ground as evenly over as the horſes could tread it; this he did to make the light ground as hard and compact as he could: in this ſituation he left it to take its chance. When the wheat was ripe, to his great ſurprize he found that it had ſtocked uncommonly, and by the extraordinary goodneſs of the crop, he had a load to an acre.

From this authentic account, I ſhall obſerve from what a ſmall quantity of ſeed a load was produced; I call it a ſmall quantity of ſeed, not the quantity ſowed, but the quantity only that eſcaped the deſolation: which is the true one. You will ſcarcely believe that this produce aroſe from between 6 and 7 pounds of ſeed; by the farmer's account of diſtance, it could not take more than 6 pounds; as wheat at the diſtance of 9 inches ſquare, will not take 7 pounds of wheat to one acre, ſee the table, page 68.

The ſame farmer told me that in the year 1767, a neighbour of his, was equally a ſufferer from worm deſtruction in the ſame ſort of land, during the winter and ſpring;

about the beginning of march, a parcel of cows were put into the wheat, and drove over it to tread it cloſe and firm, which ſtoped the progreſs of the worm; and it had the ſame good effect as to the produce, and fineſt of wheat. The wheat being ſo remarkably fine and large, that it yielded but 600 grains to one ounce, the true ſtandard for the pureſt wheat. Very little wheat is to be found where fewer grains go to one ounce; ſome run 800 grains, ſo that 700 are allowed as a medium number.

Another farmer told me the ſame fatality happened to him, and he was in great doubt whether to let it ſtand, or plow it up for ſpring corn; but ſeeing it begin to ſtock in march, he determined to ſee the conſequence; and like my other friend, found an aboudning crop when it was ripe: he apprehended it might be in thickneſs as half a buſhel of ſeed to an acre, with a produce of 12 quarters and 3 buſhels to 2 acres.

Other farmers obſerve, that on the headlands of their light ſoil, they have generally the beſt wheat, and ſuppoſe it proceeds from the firmneſs of that part, being ſo much more made compact and ſolid, by the frequent turnings of the horſes in plowing.

Hence, theſe accidental diſcoveries may be of infinite uſe in two reſpects. One of them as an inſtruction how to treat light land, for, or under wheat; the other to ſow ſparingly, whereby a ſaving of ſeed equal to half the rent of the land may be put into the farmer's pocket. The firſt account is a ſaving of 237 buſhels of ſeed wheat in 100 acres; and the other account is 200 buſhels ſaved in 100 acres: as the common quantity ſown is two buſhels and a half to one acre.

This is a very material conſideration, and I hope will ſerve to ſtrengthen what has been ſo earneſtly recommended, in the former part of this treatiſe.

It is adviſed by ſome to harrow barley after a rain, when the barley is come, or coming thro' the ground; as it pulveriſeth the earth's ſurface, and it aſſiſts it with a finer earth to root in.

A few directions follow to aſcertain the ſpecific goodneſs of wheat.

Six hundred grains of wheat to one ounce being prime wheat, and 800 the worſt ſort; a man may by weighing one quarter of an ounce, count theſe grains, and 4 times their number is the quantity. Thus, 150 grains to one quarter of an ounce, are 600 to one ounce, for prime wheat; 175 grains to one quarter of an ounce, will ſhew him that ſuch wheat is, a middling wheat, or 700 grains to one ounce; and 200 grains to one quarter of an ounce, ſhews him that ſuch is the worſt ſort of merchantable wheat; and in value no more than 6 to 8.

From hence I ſhall give the farmer 4 calcuculations, whereby he may be ſatisfyed of the goodneſs of his wheat, two of which are a proportion of ſuppoſed value, according to the grains in one ounce. And the other two, nearly the true value according to the produce of flour, allowing for increaſe of bran, according to the diminution of wheat in goodneſs; prime wheat being at 10 £. per load.

The proportion between prime wheat and the middle wheat, will then ſtand thus.

£. £. s. d.
7 : 10 : : 6 : 8: 11: 5, The ſuppoſed value for middle wheat.

Again,

£. £. s.
8 : 10 : : 6 : 7: 10, The ſuppoſed value for bad wheat.

But the true value nearly are the under proportions, allowing for increaſe of bran, according to the decreaſe of goodneſs; and are nearly as ſeven and a half to ſix in the middle wheat, and as nine to ſix nearly in the worſt wheat, thus.

£. £.
7. 5. : 10 : : 6 : 8, The true value of middle wheat.

Again,

£. £. s. d.
9 : 10 : : 6 : 6: 13: 4, The true value of bad wheat

I ſhall figure one ſum in each, which will be a guide for every other calculation, according to the price which the beſt wheat may bear. As 700 grains to one ounce the middle wheat, is to 10 £. the value of the beſt wheat: ſo are 600 grains the number in one ounce of the beſt wheat, to 8 £. 11 *s.* 5 *d.*

```
       £.
 7 : 10 : : 6:
      6
     --- £.   s.   d.
  7)60( 8 : 11 : 5, The ſuppoſed value.
     56
     ---
      4
     20
     --- s.
  7(80(11
     77
     ---
      3
     12
     --- d.
  7)36(5
     35
     ---
      1 Remaining, which is the ſeventh
```

part of a peny over.

Again,

For the true value of middle wheat.

```
         £.
 7. 5. : 10 : : 6 :
         6
         ---
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£.
7. 50.)60, 00(8, The true value.
60, 00

. . . .

N. B. 7 to 6, is the ſame proportion as 700 to 600.

Again,

Suppoſe a farmer has two other ſorts of wheat, one of which will run 620 grains to an ounce, what is the value of that wheat per load, in proportion to the beſt wheat at 10 £.

The proportion is as follows.

£. £. *s.* *d.*
620 : 10 : : 600 : 9: 13: 4: Half peny, the value ſought for; and worſt than the beſt by 6 *s.* 5 *d.* half peny per load.

Again,

Suppoſe 625 grains run to one ounce, what is the value of ſuch wheat.

£. £. *s.*
625 : 10 : : 600 9: 12, -- The value ſought for; and worſt than the beſt by 8 *s.* per load.

Again,

Suppoſe the ounce to run 630 grains, what is the value.

£. £. *s.* *d.*
630 : 10 : : 600 : 9: 10: 5: Half peny, the value ſought; and worſt than the beſt by 9 *s.* 6 *d.* half peny per load.

From hence, the value of wheat may be nearly aſcertained from the ſtandard, according to the higheſt price the beſt wheat may bear.

I hope nothing more may be ſaid to enforce the farmer to procure the fineſt wheat, as the difference in value is ſo evident by the firſt four calculations: and he muſt be fully convinced, that ſuch fine wheat is not to be produced from too thick a crop, or from land, not in high cultivation.

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